REMARKS

In the Office Action mailed December 4, 2002:

1) Claims 18-19 were rejected under 35 U.S.C. § 112, second paragraph;

2) Claims 1, 3, 9-10, 12, 14-17, 21-22, 26-27, 30-31, 33 and 38 were rejected under 35 U.S.C. § 102(e) in view of U.S. Patent No. 6,198,749 (Hui, *et al.*);

3) Claims 11, 13, 20 and 25 were rejected under 35 U.S.C. § 103(a) in view of Hui;

4) Claims 28-29, 34-37 and 39 were allowed; and

5) Claims 2, 4-8, 23-24 and 32 were objected to.

The claims have been amended as indicated in the attached Appendix A, and the following Remarks are offered. Re-examination is requested.

I. Rejections under 35 U.S.C. § 112

Claims 18 and 19 have been amended to more particularly point out and distinctly claim the corresponding subject matter.

II. U.S. Patent No. 6,198,749 (Hui)

The invention disclosed in Hui is described as a "system for transmitting and receiving data at high-speeds using regular analog channel connections" (column 1, lines 6-8).

1. Hui Does Not Teach or Suggest the Use of Different Idle Signals

In one or more claimed embodiments of Applicants' invention, different idle signals are sent after successive communications (e.g., packets). This is described at, *inter alia*, page 23, lines 26-30 of the application as filed. Using different idle signals may facilitate synchronization among the multiple channels (*see, e.g.*, page 21, lines 6-11).

In contrast, Hui does not describe the use of different types of idle signals. Hui states that

> The high-speed digital signal 16 is split into two low-speed digital signals and framed for transmission across analog channels .... The signals on the analog channels 28, 29 are transmitted across the PSTN 60 in accordance with whatever transmission and switching means is employed by the PSTN 60. (Column 5, lines 48-54)

Thus, Hui uses the default framing for the analog connections, without specifying the use of varying idle signals or codes.

III. Selected Claims

1. Claims 1-3, 41-50, 51

Claim 1 of the application has been amended to incorporate the subject matter of objected-to claim 2. Claim 2 has been cancelled. Claims 40-49 correspond to original claims 4-9 and 12-15. Claim 50 corresponds to the method of claim 1, as amended.

2. Claims 4-15, 52-54

Objected-to claim 4 has been amended to incorporate the subject matter of base claim 1. Claims 5-15 have been amended to depend from claim 4. Claims 51-52 correspond to original claims 2-3. Claim 53 corresponds to the method of claim 4, as amended.

3. Claims 16-22, 55-56, 57

Claim 16 has been amended to reflect an embodiment of the invention in which different idle codes are transmitted, across each of multiple channels coupling the first and second network entities, after each communication. As described above, Hui does not use different idle codes. Claims 54-55 correspond to original claims 23-24. Claim 56 corresponds to the method of claim 16, as amended.

4. Claims 23-25, 58-60, 61

Objected-to claim 23 has been amended to incorporate the subject matter of base claim 16 and intervening claim 22. Claims 57-59 correspond to original claims 17-19. Claim 60 corresponds to the method of claim 23, as amended.

5. Claims 28-29, 62-67, 68

Claims 28-29 were allowed. Claims 61-66 were added to depend from claim 28. Claim 67 corresponds to the method of claim 28.

6. Claims 30-33, 69-70, 71

Claim 30 has been amended to include the subject matter of objected-to claim 32. Claim 32 has been cancelled. Claims 68-69 have been added to depend from claim 30. Claim 70 corresponds to the method of claim 30.

7. **Claims 34-37**

Claims 34-37 were allowed.

8. **Claims 39, 40**

Claim 39 was allowed. Claim 40 was added to depend from claim 39.

CONCLUSION

No new matter has been added with the preceding amendments. It is submitted that the Examiner's rejections have been traversed and the present application is in suitable condition for allowance. Such action is respectfully requested. If prosecution of this application may be facilitated through a telephone interview, the Examiner is invited to contact Applicant's attorney identified below.

Respectfully submitted,

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APPENDIX A

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Drawings:

Please replace drawings 4, 5A-5D with the substitute FIGs. 4, 5A-5D provided with the accompanying Letter to the Official Draftsperson. These drawings were amended to correspond to the specification.

In the Specification:

Please amend the paragraph on page 1, lines 11-14, as follows:

This invention relates to the fields of computer systems and networks. More particularly, a method and apparatus are provided for interfacing a computer system or other device to an Ethernet network at a high rate of data transfer [is provided].

Please amend the paragraph on page 3, lines 1-13, as follows:

In one embodiment of the invention, [invention] a system and methods are provided for interfacing a computer system or other network entity to an Ethernet network, [network] and for transferring data to and from the entity at multiple gigabits per second.

Please amend the paragraph on page 4, lines 10-17, as follows:

Illustratively, the size of each mini-frame of an Ethernet frame (i.e., the portion of the frame carried by one channel) will equal [to] the size of the other mini-frames, plus or minus one byte. This provides one easy method of detecting an error in the transmission or reception of a frame. Further, frame sequencing may be enforced by providing multiple different codes or symbols to represent the period between frames (e.g., the Inter-Packet Gap or IPG). With this method of frame sequencing, a receiving entity may synchronize the multiple channels by monitoring which codes or symbols are received during each gap.

Please amend the paragraph on page 6, lines 21-25, as follows:

In one embodiment of the invention, [invention] an interface is described for connecting a computer system to an Ethernet network at a data transfer rate exceeding

1 Gbps. In one particular implementation of this embodiment, [embodiment] the network interface exchanges communications with the Ethernet network at a rate of approximately 10 Gbps.

Please amend the paragraph on page 9, lines 14-24, as follows:

In the illustrated embodiment, the design and operation of 10GMII 102 and each 2GMII 104 are based on the full duplex subset of the GMII described in the IEEE 802.3 standard. During operation of the embodiment depicted in FIG. 1, distributor/collector 100 receives frames, or packets, from a Medium Access Control (MAC) layer through 10GMII 102 at a rate in excess of 1 Gbps (e.g., up to approximately 10 Gbps in the illustrated embodiment). Similarly, distributor/collector 100 operates in the reverse direction to provide a MAC layer with reconstructed frames at the same rate of transfer. This transmission rate is approximately equal to the sum of the rates at which data are [is] transferred across the 2GMII interfaces that connect distributor/collector 100 to each PCS. Thus, in FIG. 1, each 2GMII may operate at a rate of approximately 2.5 Gbps.

Please amend the paragraph on page 12, lines 1-7, as follows:

The manner in which frame elements are scattered or allotted among multiple channels, [channels] and the manner in which the frames are reconstructed, [reconstructed] are described in detail in the following section. In short, however, individual frame elements (e.g., bytes) are distributed among multiple logical channels (e.g., four in the embodiment depicted in FIG. 2) on a round-robin basis. Each channel thus carries one "mini-frame" or "mini-packet," the contents of which will be reunited with those of the other mini-frames at the receiving entity.

Please amend the paragraph on page 19, lines 16-21, as follows:

FIGs. 3A-3B are flowcharts demonstrating one method of transmitting a packet (FIG. 3A) and one method of receiving a packet (FIG. 3B) across multiple channels in one embodiment of the invention. For purposes of FIGs. 3A-3B, an Ethernet interface device as described above is configured to transmit and receive data at a rate of approximately 10 Gbps in each direction by striping each packet across four logical channels.

In the Claims:

1. (Once Amended) A method of transmitting a communication from a first network entity to a second network entity, wherein the first network entity and the second network entity are coupled to a communication medium, comprising:

receiving a communication from a process operating on a first network entity, wherein the communication is directed to a second network entity;

distributing elements of said communication into multiple portions;

sending a first portion of said communication on a first channel established on a first communication medium coupled to said first network entity and said second network entity; and

sending a second portion of said communication on a second channel established on a second communication medium coupled to said first network entity and said second network entity;

wherein said communication is transmitted to said second entity at a data rate in excess of one gigabit per second.

2. CANCEL

3. (Unchanged) The method of claim 1, wherein said communication is an Ethernet frame and wherein each of said multiple portions of said communication comprises one or more bytes.

4. (Once Amended) A method of transmitting a communication from a first network entity to a second network entity, wherein the first network entity and the second network entity are coupled to a communication medium, comprising: [The method of claim 1, in which said receiving comprises]

receiving a communication at a distribution module of a network interface device from a medium access control module across a first interface, wherein said distribution module is configured to distribute portions of said communication among a plurality of communication channels;

distributing elements of said communication into multiple portions;

sending a first portion of said communication on a first channel established on a first communication medium coupled to said first network entity and said second network entity; and

sending a second portion of said communication on a second channel established on a second communication medium coupled to said first network entity and said second network entity.

5. (Unchanged) The method of claim 4, wherein said first interface is configured to convey said communication at a data rate exceeding one gigabit per second.

6. (Unchanged) The method of claim 4, in which said sending a first portion of said communication comprises forwarding an apportionment of said communication elements to a first physical coding module across a second interface; and

wherein said first physical coding module is configured to encode said apportionment of communication elements into a series of codes for transmission over said first communication medium.

7. (Unchanged) The method of claim 6, wherein said first physical coding module:

encodes a first element of said apportionment with a first start code if said first element is the first element of said communication and otherwise encodes said first element of said apportionment with a second start code; and

encodes a last element of said apportionment with a first end code if said last element is the last element of said communication and otherwise encodes said last element of said apportionment with a second end code.

8. (Unchanged) The method of claim 6, wherein said second interface is configured to convey said first apportionment at a data rate exceeding one gigabit per second.

9. (Once Amended) The method of claim 4 [1], in which said distributing comprises allotting elements of said communication among a plurality of channels established to convey a communication between said first network entity and said second network entity.

10. (Unchanged) The method of claim 9, wherein each of said channels is configured to traverse a separate physical communication link.

11. (Unchanged) The method of claim 9, wherein each of said channels is configured to traverse a common physical communication link, said common physical communication link comprising said first communication medium and said second communication medium.

12. (Once Amended) The method of claim 4 [1], wherein:

one of said first portion of said communication and said second portion of said communication includes a first start symbol configured to indicate a start of said communication and the other of said first portion and said second portion includes a second start symbol configured to indicate a start of a portion of said communication; and

one of said first portion of said communication and said second portion of said communication includes a first end symbol configured to indicate an end of said communication and the other of said first portion and said second portion includes a second end symbol configured to indicate an end of a portion of said communication.

13. (Once Amended) The method of claim 4 [1], further comprising:

transmitting a first idle signal on said first channel and said second channel prior to said receiving; and

transmitting a different idle signal on said first channel and said second channel after said sending a second portion of said communication.

14. (Once Amended) The method of claim 4 [1], further comprising:

encoding the first element of said first portion of said communication with a first starting delimiter; and

encoding the first element of said second portion of said communication with a second starting delimiter.

15. (Unchanged) The method of claim 14, further comprising:

encoding the last element of said first portion of said communication with a first ending delimiter; and

encoding the last element of said second portion of said communication with a second ending delimiter.

16. (Once Amended) A method of receiving a communication at a second network entity from a first network entity, wherein the first network entity and the second network entity are coupled to a dedicated communication medium, comprising:

receiving at a second network entity a first idle code on each of multiple channels established between a first network and said second network entity;

receiving at said [a] second network entity a first portion of a communication from said [a] first network entity on a first channel of said multiple channels [established between said first network entity and said second network entity];

receiving at said second network entity a second portion of said communication on a second channel of said multiple channels [established between said first network entity and said second network entity];

collecting an element of said first portion and an element of said second portion;

receiving at said second network entity a second idle code, different from said first idle code, on each of said multiple channels; and

forwarding said communication toward a process operating on said second network entity.

17. (Unchanged) The method of claim 16, wherein said communication is an Ethernet frame.

18. (Once Amended) The method of claim 17, wherein said first portion of a communication comprises [in which said receiving a first portion of a communication comprises]:

a first start signal configured to indicate a beginning of said communication; and

a first set of elements of said communication.

[receiving over a first communication channel a first transmission from said first network entity, said first transmission including:

a first signal configured to indicate one of a beginning of a

communication and a beginning of a portion of a communication; and

a first series of one or more elements of said communication.]

19. (Once Amended) The method of claim 18, wherein said second portion of a communication comprises [in which said receiving a second portion of said communication comprises]:

a second start signal configured to indicate a beginning of a portion of said communication, said second start signal differing from said first start signal; and

a second set of elements of said communication.

[receiving over a second communication channel a second transmission from said first network entity, said second transmission including:

a second series of one or more elements of said communication; and

a second signal configured to indicate one of an end of said communication and an end of a portion of said communication.]

20. (Unchanged) The method of claim 16, wherein said first communication channel and said second communication channel traverse a common communication medium.

21. (Unchanged) The method of claim 16, wherein said first communication channel and said second communication channel traverse separate physical mediums.

22. (Unchanged) The method of claim 16, in which said collecting comprises:

receiving at a collection module an element of said first communication portion and an element of said second communication portion; and

combining said element of said first communication portion and said element of said second communication portion.

23. (Once Amended) A method of receiving a communication at a second network entity from a first network entity, wherein the first network entity and the second network entity are coupled to a dedicated communication medium, comprising: [The method of claim 22, wherein said forwarding comprises]

receiving at a second network entity a first portion of a communication from a first network entity on a first channel established between said first network entity and said second network entity;

receiving at said second network entity a second portion of said communication on a second channel established between said first network entity and said second network entity;

receiving at a collection module an element of said first communication portion and an element of said second communication portion;

combining said element of said first communication portion and said element of said second communication portion; and

sending said combined elements to a medium access control module across a first interface toward a process operating on said second network entity.

24. (Unchanged) The method of claim 23, wherein said first interface is configured to convey said combined elements at a data rate greater than one gigabit per second.

25. (Once Amended) The method of claim 23 [16], further comprising:

receiving a first idle code on each of said first channel and said second channel prior to said receiving a first portion of a communication; and

receiving a second idle code on each of said first channel and said second channel after said receiving a second portion of said communication [forwarding].

26. CANCEL

27. CANCEL

28. (Unchanged) A method of receiving a communication from a first network entity at a second network entity across a plurality of channels, comprising:

receiving synchronization information across each of a plurality of channels coupling a first network entity to a second network entity;

receiving at said second network entity a set of bytes across each of said channels;

detecting a first byte and a last byte in each of said sets of bytes;

decoding each of said sets of bytes; and

re-assembling said sets of bytes into a stream of bytes of a communication directed from said first network entity to said second network entity.

29. (Unchanged) The method of claim 28, in which:

said receiving synchronization information comprises receiving a first idle code on each of said channels; and

wherein said method further comprises receiving a second idle code on each of said channels after said receiving a set of bytes across each of said channels.

30. (Once Amended) A method of operating a computer to communicate with a network entity, comprising:

operating a medium access control module configured to communicate a first frame from a computer system to a network entity and receive a second frame at said computer system from said network entity;

operating a distribution module to apportion contents of said first frame among a plurality of communication channels coupling said computer system to said network entity through one or more communication links; and

operating a collection module to combine contents of said second frame received through said plurality of communication channels;

wherein said distribution module and said collection module interface with each of said communication channels at a rate exceeding one gigabit per second; and

wherein said medium access control module interfaces with said distribution module and said collection module at a rate substantially equal to the sum of said rates at which said communication channels interface with said distribution module and said collection module.

31. (Unchanged) The method of claim 30, further comprising:

operating a physical medium module configured to encode said first frame contents for transmission over said communication channels and decode said second frame contents received over said communication channels.

32. CANCEL

33. (Unchanged) The method of claim 30, wherein said first frame is a communication frame configured for transmission over an network compatible with an Ethernet communication protocol.

34. (Unchanged) A network interface device for coupling a computer system to a network, comprising:

a medium access control module configured to communicate with an application executing on a computer system;

multiple physical coding modules, wherein each said physical coding module is configured to encode packet bytes for transmission on a network medium and decode encoded bytes received from said network medium, and wherein said network medium is configured to carry said bytes between said computer system and a network entity;

a distributor configured to accept a first packet from said medium access control module and divide said first packet into a first plurality of packet bytes for transmission across said network medium; and

a collector configured to accept a second plurality of packet bytes from said multiple physical coding modules and combine said second plurality of packet bytes into a second packet for transfer to said medium access control module.

35. (Unchanged) The network interface device of claim 34, further comprising a first set of interfaces coupling said multiple physical coding modules to said distributor and said collector, wherein each of said first set of interfaces is configured to operate at a rate exceeding one gigabit per second.

36. (Unchanged) The network interface device of claim 35, further comprising a second interface coupling said distributor and said collector to said medium access control module, wherein said second interface is configured to operate at a rate approximately equal to the sum of said operation rates of said first set of interfaces.

37. (Unchanged) The network interface of claim 36, wherein said second interface is configured to operate at a data rate of approximately ten gigabits per

second.

38. CANCEL

39. (Unchanged) A device for implementing an Ethernet protocol to communicate Ethernet frames between a first network entity and a second network entity, comprising:

a distributor configured to distribute bytes of a first Ethernet frame over a plurality of channels in a first order;

a collector configured to receive bytes of a second Ethernet frame over said channels in a second order;

a first interface coupling said distributor and said collector to a medium access control module at a data rate exceeding one gigabit per second, wherein data is transferred across said first interface in multi-byte units in synchronization with both edges of a clock signal; and

a second interface coupling said distributor and said collector to a physical coding module at a data rate exceeding one gigabit per second in synchronization with both edges of a second clock signal.

40. (New) The device of claim 39, wherein said first order and said second order are round robin.

41. (New) The method of claim 1, wherein:

said receiving comprises receiving a communication at a distribution module of a network interface device from a medium access control module across a first interface; and

said distribution module is configured to distribute portions of said communication among a plurality of communication channels, including said first channel and said second channel.

42. (New) The method of claim 41, wherein said first interface is configured to convey said communication at a data rate exceeding one gigabit per second.

43. (New) The method of claim 41, in which said sending a first portion of said communication comprises forwarding an apportionment of said communication elements to a first physical coding module across a second interface; and

wherein said first physical coding module is configured to encode said apportionment of communication elements into a series of codes for transmission over said first communication medium.

44. (New) The method of claim 43, wherein said first physical coding module:

encodes a first element of said apportionment with a first start code if said first element is the first element of said communication and otherwise encodes said first element of said apportionment with a second start code; and

encodes a last element of said apportionment with a first end code if said last element is the last element of said communication and otherwise encodes said last element of said apportionment with a second end code.

45. (New) The method of claim 43, wherein said second interface is configured to convey said first apportionment at a data rate exceeding one gigabit per second.

46. (New) The method of claim 1, in which said distributing comprises:

allotting elements of said communication among a plurality of channels established to convey a communication between said first network entity and said second network entity, including said first channel and said second channel.

47. (New) The method of claim 1, wherein:

one of said first portion of said communication and said second portion of said communication includes a first start symbol configured to indicate a start of said communication and the other of said first portion and said second portion includes a second start symbol configured to indicate a start of a portion of said communication; and

one of said first portion of said communication and said second portion of said

communication includes a first end symbol configured to indicate an end of said communication and the other of said first portion and said second portion includes a second end symbol configured to indicate an end of a portion of said communication.

48. (New) The method of claim 1, further comprising:

transmitting a first idle signal on said first channel and said second channel prior to said receiving; and

transmitting a second idle signal on said first channel and said second channel after said sending a second portion of said communication;

wherein said second idle signal is different from said first idle signal.

49. (New) The method of claim 1, further comprising:

encoding the first element of said first portion of said communication with a first starting delimiter; and

encoding the first element of said second portion of said communication with a second starting delimiter;

wherein said second starting delimiter is different from said first starting delimiter.

50. (New) The method of claim 49, further comprising:

encoding the last element of said first portion of said communication with a first ending delimiter; and

encoding the last element of said second portion of said communication with a second ending delimiter;

wherein said second ending delimiter is different from said first ending delimiter.

51. (New) A computer readable storage medium storing instructions that, when executed by a computer, cause the computer to perform a method of transmitting a communication from a first network entity to a second network entity, the method comprising:

receiving a communication from a process operating on a first network entity, wherein the communication is directed to a second network entity;

distributing elements of said communication into multiple portions;

sending a first portion of said communication on a first channel established on a first communication medium coupled to said first network entity and said second network entity; and

sending a second portion of said communication on a second channel established on a second communication medium coupled to said first network entity and said second network entity;

wherein said communication is transmitted to said second entity at a data rate in excess of one gigabit per second.

52. (New) The method of claim 4, wherein said communication is transmitted to said second entity at a data rate in excess of one gigabit per second.

53. (New) The method of claim 4, wherein said communication is an Ethernet frame and wherein each of said multiple portions of said communication comprises one or more bytes.

54. (New) A computer readable storage medium storing instructions that, when executed by a computer, cause the computer to perform a method of transmitting a communication from a first network entity to a second network entity, the method comprising:

receiving a communication at a distribution module of a network interface device from a medium access control module across a first interface, wherein said distribution module is configured to distribute portions of said communication among a plurality of communication channels;

distributing elements of said communication into multiple portions;

sending a first portion of said communication on a first channel established on a first communication medium coupled to said first network entity and said second network entity; and

sending a second portion of said communication on a second channel established on a second communication medium coupled to said first network entity and said second network entity.

55. (New) The method of claim 22, wherein said forwarding comprises sending said combined elements to a medium access control module across

a first interface toward a process operating on said second network entity.

56. (New) The method of claim 55, wherein said first interface is configured to convey said combined elements at a data rate greater than one gigabit per second.

57. (New) A computer readable storage medium storing instructions that, when executed by a computer, cause the computer to perform a method of receiving a communication at a second network entity from a first network entity, the method comprising:

receiving at a second network entity a first idle code on each of multiple channels established between a first network and said second network entity;

receiving at said second network entity a first portion of a communication from said first network entity on a first channel of said multiple channels;

receiving at said second network entity a second portion of said communication on a second channel of said multiple channels;

collecting an element of said first portion and an element of said second portion;

receiving at said second network entity a second idle code, different from said first idle code, on each of said multiple channels; and

forwarding said communication toward a process operating on said second network entity.

58. (New) The method of claim 23, wherein said communication is an Ethernet frame.

59. (New) The method of claim 23, wherein said first portion of a communication comprises:

a first start signal configured to indicate a beginning of said communication; and

a first set of elements of said communication.

60. (New) The method of claim 59, wherein said second portion of a communication comprises:

a second start signal configured to indicate a beginning of a portion of said communication, said second start signal differing from said first start signal; and

a second set of elements of said communication.

61. (New) A computer readable storage medium storing instructions that, when executed by a computer, cause the computer to perform a method of receiving a communication at a second network entity from a first network entity, the method comprising:

receiving at a second network entity a first portion of a communication from a first network entity on a first channel established between said first network entity and said second network entity;

receiving at said second network entity a second portion of said communication on a second channel established between said first network entity and said second network entity;

receiving at a collection module an element of said first communication portion and an element of said second communication portion;

combining said element of said first communication portion and said element of said second communication portion; and

sending said combined elements to a medium access control module across a first interface toward a process operating on said second network entity.

62. (New) The method of claim 28, wherein:

the communication is a packet; and

said receiving a set of bytes comprises receiving across each said channel a mini-frame comprising a portion of the packet.

63. (New) The method of claim 62, wherein said detecting comprises:

on a first of said channels, identifying a start of packet delimiter; and

on the other channels of said channels, identifying a start of mini-frame delimiter.

64. (New) The method of claim 62, wherein said detecting comprises:

on a first of said channels, identifying an end of packet delimiter; and

on the other channels of said channels, identifying an end of mini-frame delimiter.

65. (New) The method of claim 62, wherein:

said re-assembling comprises merging said mini-frames to re-form the packet; and

the method further comprises forwarding the packet toward a medium access control module.

66. (New) The method of claim 28, wherein each said set of bytes is received at a data rate exceeding one gigabit per second.

67. (New) The method of claim 28, wherein said decoding comprises:

at a physical coding module coupled to each of said channels, decoding a set of bytes from codes received over said channel.

68. (New) A computer readable storage medium storing instructions that, when executed by a computer, cause the computer to perform a method of receiving a communication from a first network entity at a second network entity across a plurality of channels, the method comprising:

receiving synchronization information across each of a plurality of channels coupling a first network entity to a second network entity;

receiving at said second network entity a set of bytes across each of said channels;

detecting a first byte and a last byte in each of said sets of bytes;

decoding each of said sets of bytes; and

re-assembling said sets of bytes into a stream of bytes of a communication directed from said first network entity to said second network entity.

69. (New) The method of claim 30, wherein said distribution module apportions said contents of said first frame by:

receiving a portion of said first frame from said medium access control

module; and

distributing said portion of said first frame among said plurality of communication channels in round robin order.

70. (New) The method of claim 30, wherein said collection module combines said contents of said second frame by:

merging, in round robin order, segments of said second frame received from said plurality of communication channels; and

forwarding said merged segments to said medium access control module.

71. (New) A computer readable storage medium storing instructions that, when executed by a computer, cause the computer to perform a method of operating a computer to communicate with a network entity, the method comprising:

operating a medium access control module configured to communicate a first frame from a computer system to a network entity and receive a second frame at said computer system from said network entity;

operating a distribution module to apportion contents of said first frame among a plurality of communication channels coupling said computer system to said network entity through one or more communication links; and

operating a collection module to combine contents of said second frame received through said plurality of communication channels;

wherein said distribution module and said collection module interface with each of said communication channels at a rate exceeding one gigabit per second; and

wherein said medium access control module interfaces with said distribution module and said collection module at a rate substantially equal to the sum of said rates at which said communication channels interface with said distribution module and said collection module.